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Reconciling the rule of law with adaptive regulation of marine ecosystems – *Challenges and opportunities for the Arctic and beyond*

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Over the past 50 years, humans have changed marine ecosystems more rapidly and extensively than in any comparable period in human history. These changes have been the effect of meeting growing needs for living and non-living marine resources, shipping, and the need for marine space for economic and social development. The cumulative impact of these developments is increasingly crippling the marine ecosystems.

Marine ecosystems need to maintain their core functions (resilience) to cater for the various human uses. Accordingly, the ecosystem approach has been the governance concept of choice for the international and European policymakers alike. This work has resulted in several legal and semi-legal instruments within OSPAR, HELCOM, the European Union, and the like. One common strand in many areas of international and EU marine regulation is a call for adaptive management which would facilitate a close linkage between the latest scientific knowledge on the condition and functioning of the marine environment on the one hand, and the management of human activities at sea on the other. The effectiveness of marine governance requires a solid scientific basis, yet one is often lacking. Nowhere are these scientific uncertainties greater than in the Arctic.

As both the management and the regulation of the marine environment are limited by significant gaps and uncertainties in scientific knowledge, adaptive management and regulation of human activities at sea may require uncomfortable concessions from the traditional rule of law values, such as predictability and stability of licenses and permits to utilise marine areas and resources. Yet, scientific knowledge may also require the law to drive changes to established socio-economic practices that are environmentally harmful. Here, adaptive regulation may be problematic if the political discretion in environmental management is not sufficiently controlled by the law. The level of scientific uncertainty is closely linked to what kind of regulation is needed to achieve environmental and other policy goals.

This special issue addresses the question of how law can facilitate adaptive management of marine ecosystems without overlooking important rule of law values such as predictability, stability, coherence, or accountability. The issue sheds light on the possible challenges and opportunities for reconciling adaptive management and -regulation with the rule of law in the Arctic marine region and beyond.

The Arctic is a complex geographical area to govern sustainably due to strong geopolitical and socio-economic interests, high ecological vulnerability and importance, as well as significant legal and institutional fragmentation. Intensifying human pressures in this area necessitate an ecosystem-based and adaptive approach, an approach that enables managing the social-ecological resilience in the Arctic. Froukje Maria Platjouw assesses the status quo for ecosystem-based governance (EBG) in the Arctic and proposes a focus on three components of EBG: holistic, integrative and adaptive governance.

These three components could be fostered through certain dimensions of legal coherence. Firstly, holistic EBG requires managing beyond administrative and jurisdictional boundaries. In this regard, legal coherence is of importance especially in geographical areas where several regulatory and/or governance arrangements overlap, such as in the Arctic. Fostering holistic EBG requires legal coherence among objectives, principles, rules, terminology and definitions used across legal acts, frameworks and even jurisdictions. Secondly, EBG aims at a fair balancing of both the sustainable use of marine ecosystems as well as the maintenance of their integrity, in order to ensure their long-term resilience and productivity. Decision-making principles and methodologies to integrate and weigh different values and interests need to be coherent across sectors and jurisdictions. Thirdly, the level of scientific uncertainty related to the functioning of the Arctic ecosystem, the cascading effects of human-induced and natural changes, and the rapidity of change necessitate cautiousness and adaptivity in decision-making processes on the Arctic. In a transboundary marine ecosystem such as

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the Arctic, it is desirable to aim at a degree of coherence in the design for adaptive regulation. So, Platjouw suggests that there is an important role for law in fostering EBG in the Arctic. Yet, this requires a pragmatic and gradual approach. By gradually developing coherent legal frameworks for single activities with an impact on the Arctic, such as aquaculture or deep seabed mining, or for tools such as marine protected areas or marine spatial planning, transboundary EBG could be fostered.

Focusing on the Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean, Rosemary Rayfuse illustrates how science can inform law-making while preserving legal predictability and stability. In her paper, Rayfuse explains the role of law in the regulation of fishing activities in the Central Arctic Ocean (CAO) and demonstrates that the newly adopted Agreement represents a model of adaptive international law-making both in form and substance.

To illustrate this, the Agreement has been adopted in advance of any fishing activities in the area and in almost complete absence of knowledge as to whether, and if so, any such activity might take place in the future. In this respect both the development and the implementation of the Agreement are intimately linked with developing science and the need for legally predictable and stable yet adaptive, precautionary, science-based management. With respect to substance, the Agreement provides a mechanism whereby necessary scientific knowledge can be acquired and then used to inform decisions about future conservation and management measures. While this may fall short of a complete ban or moratorium on CAO commercial fishing advocated by NGOs, in theory at least, it represents an attempt to ensure that no commercial fishing will take place unless and until it can be done on a sustainable basis and in accordance with conservation and management measures established by the parties to the Agreement. Rayfuse concludes that the adopted Agreement is a novel, legally adaptive, first step in what will be a science-based approach to managing the high seas fishery resources of the CAO. The Agreement provides the initial framework for precautionary, ecosystem-based, adaptive and environmentally sound decision making regarding potential future fisheries in the CAO.

Focusing on EU Common Fisheries Policy (CFP), Brita Bohman analyses the interplay of adaptivity and the rule of law in the context of CFP landing obligation. The most recently revised CFP Regulation, adopted in 2013, includes a number of significant changes with the aim to make fisheries more in tune with ecosystem approach and to avoid unsustainable exploitation of marine biological resources, including fish. The revised CFP Regulation introduces an obligation to land all catches as opposed to the previous industry praxis of discarding fish and other marine biological resources in order to optimize their catch. The landing obligation aims for new adaptive fishing methods and strategies, which are adjusted to ecosystem factors. The paper analyses reflections on the required balance between adaptive approaches connected to the ecosystem approach and the strictness established by rule of law principles in relation to the EU CFP landing obligation. Bohman concludes that the best way to establish a control system adjusted to these factors is by giving more influence to the fishing industry. Involving stakeholders on all levels and by utilising a broad range of policy instruments would constitute a framework capable of reconciling grassroots industrial adaptation with top down legal requirements.

Sigrid Eskeland Schütz and Anne-Michelle Slater discuss adaptivity and the rule of law in the context of aquaculture and offshore windfarms. They review and compare the core legal frameworks regulating these two sectors in Norway and Scotland, with a focus on strategic planning, marine spatial planning and licensing systems. In their paper, they analyse how the legal frameworks facilitate adaptivity, and how predictability and finality of plans and licenses is balanced against the need to change management practices. A central question in their paper is whether plans for large marine ecosystems, marine spatial plans and various licensing schemes for offshore wind and aquaculture in both Norway and Scotland undermine predictability for private stakeholders.

In the context of large marine ecosystem planning, the legal frameworks of the two countries promote an ecosystem approach and adaptive management. This can potentially weaken legal predictability and stability. This notwithstanding, the prevailing view is that, by contributing to clarity in terms of legal and policy frameworks, coordination, and management priorities, large marine ecosystem planning promotes predictability. Similarly, in the context of marine spatial planning, which is generally based upon adaptive management principles, such as science-based cyclical processes to adapt plans, predictability is often ensured through separation of powers, planning hierarchies from strategies to licenses and advance licenses. Schütz and Slater conclude that the constant evolution of the management systems in both countries reflects the ability to change management practices, policies and laws to facilitate responses to emerging challenges. At the same time, democratic process for legislative changes offers legal systemic predictability for the marine economic actors.

Focusing on aquaculture, Robin Craig analyses how law can promote the adaptivity of marine aquaculture to climate change and ocean acidification — adaptive marine aquaculture — while still preserving key rule-of-law values, such as public participation and accountability. Worldwide, as wild-caught commercial fisheries plateau and human demands for protein increase, marine aquaculture is expanding. Nevertheless, siting of marine aquaculture operations is subject to competing environmental, economic, and social demands upon and priorities for ocean space, while some forms of marine aquaculture can impose other externalities on marine systems, such as pollution from wastes (nutrients) and antibiotics, consumption of wild fish as food, and introduction of non-native or genetically modified species. As a result, governmental policy decisions to promote both marine aquaculture that can adapt to chancing ecological realities, technologies and values may become contested, requiring attention to their social legitimacy.

Craig argues, that most obviously, law can establish substantive requirements for marine aquaculture that minimize its impacts, promoting marine resilience overall. However, she maintains that to foster truly adaptive marine aquaculture, including adaptive governance institutions, coastal nations should also procedurally reform their marine spatial planning efforts to legally connect the procedures for aquaculture permitting, marine spatial planning (MSP), and adaptive management. One goal of such connections, moreover, should be to mandate new forums for public participation and creative collaboration, promote experimentation with accountability that leads to increased knowledge, and foster the emergence of adaptive governance regarding the use of marine space.

Continuing on aquaculture, Niko Soininen, Antti Belinskij, Jukka Similä and Raine Kortet analyse the legal adaptive capacity for increasing fish aquaculture production in EU-Finland, while safeguarding the ecological resilience of the Baltic Sea. The guiding question is whether the current legal framework allows reconciling two competing policy goals, namely growing the aquaculture sector and reaching the good ecological status of coastal and marine waters.

Currently, fish aquaculture is driven by increasing global demand of fish, declining natural fisheries, food security and blue growth policies. At the same time, environmental policies such as the EU Water Framework Directive and the Marine Strategy Framework Directive set strict legal-ecological requirements for the industry's nutrient emissions. These legal requirements have potential to force the aquaculture industry to adapt to more environmentally sound practices and technologies with less nutrient impact, but they can also discourage and decommission aquaculture production around the Baltic Sea increasing the demand for fish production, and the related environmental impact, somewhere else. In line with the mitigation hierarchy, the paper establishes four alternative pathways for the fish aquaculture industry to grow without increasing its environmental nutrient footprint significantly, and evaluates the legal adaptive capacity and the legal risks attached to these pathways. Located along the mitigation hierarchy, these pathways contain closed-loop technologies, efficient use of fish feed and effective waste-water management, flexible farming strategies as well as several remediation and offsetting measures. While avoiding

nutrients with closed-loop technology promises little legal risk, there are doubts as to the economic feasibility of the technology. At the other end of the hierarchy, the Water Framework Directive and the Finnish Environmental Protection Act do not support nutrient offsetting across different water bodies, or across sectors (e.g. between agriculture and aquaculture). Soininen et al. conclude that the current legal framework contains promise for shifting the aquaculture industry onto a more ecologically sustainable path but at the same time several more detailed obstacles for allowing the industry to adapt without collapsing. Going forward, there is a need to manage and regulate the environmental impact of food production across sectors.

This special issue explores potential avenues as well as good examples that allow reconciling different rule of law values, including coherence, predictability, stability and legal certainty, public participation, and accountability, with the need for adaptive regulation and governance. Adaptivity may be built into the legal design of aquaculture or fisheries regulation, adaptivity may be fostered through iterative planning and licensing systems, and also the law-making process itself may be adaptive. The authors provide successful examples of reconciling rule of law values and adaptivity to changes in science and circumstances, and provide suggestions for better reconciliation where appropriate.